COLONY OF MAURITIUS

DEPARTMENT OF AGRICULTURE

Twenty-first Annual Report

of the

Sugarcane Research Station

1950

PRINTED AND PUBLISHED BY
J. ELIEL FELIX, GOVERNMENT PRINTER,
PORT LOUIS, MAURITIUS
FEBRUARY 1952

SUGARCANE RESEARCH STATION, MAURITIUS
21ST ANNUAL REPORT, 1950

TABLE OF CONTENTS

	PAGE
Staff	I
Policy of the Station	II
Introduction by the Acting Officer-in-Charge	1
Part I—Report on the Cane Breeding Division	5
Part II—Report on the Chemistry Division	18
Part III—Report on the Botany Division	29
Part IV—Report on the Extension Service Division ...	37

STAFF

Acting Officer-in-chage	A. de Sornay, Dip. Agric. (Mauritius), I,A.C. (Paris). B.Sc. (London)

Cane Breeding Division

Plant Breeder	A. de Sornay, Dip. Agric. (Mauritius). I.A.C. (Paris) B.Sc. (London)
Assistant Plant Breeder	P.R. Hermelin, Dip Agric. (Mauritius)

Chemistry Division

Chemist	Vacant
Assistant Chemist	S. M. Feillafé, Dip. Agric. (Mauritius), A. C. R (Mauritius) (acting as Chemist)

Botany Division

Botanist	Vacant
Assistant Botanist	E. Rochecouste, Dip. Agric. (Mauritius), B. Sc. (London) (acting as Botanist), on leave as from July 1950
Officer in charge of cultural methods	B. Nundloll

Extension Service Division

Senior Field Demonstrator	G, Mazery, Dip Agric. (Mauritius,
Field Demonstrators	J. Marot M. Sooltangos, Dip. Agric. (Mauritius) G. Avice D. Reetoo B. Roy, Dip. Agric. (Mauritius) J. B. de Gersigny

---

RESEARCH ADVISORY COMMITTEE OF THE SUGARCANE RESEARCH STATION FOR THE YEAR 1950

Ex-Officio :—

The Director of Agriculture—*Chairman*
The Chemist
The Botanist
The Plant Breeder

Nominated by His Excellency the Governor :—

Hon ; D. Luckeenarain
Hon : A. M. Osman, O.B.E.

Nominated by the Advisory Board of the Mauritius College of Agriculture:—

Mr. G. P. Langlois
Mr. Pierre Halais

Nominated by the Sugar Industry Reserve Fund Committee :—

Mr. Pierre de Sornay, *Chevalier de la Legion d'Honneur*
Mr. F. North Coombes

Policy of the Station

The policy of the Sugarcane Reseach Station is to improve the yield of sugar from evcry acre of land under cane and to extend the area capable of being planted in cane, in order to increase the total sugar output of the Colony.

The means by which this policy is carried out are :—

(a) breeding and testing of new canes with the object of producing varieties yielding more sugar to the acre and resistant to the main pests and diseases of cane in Mauritius ;

(b) breeding of early-maturing, high-yielding canes, so as to increase the area of cane which can be harvested at the time of maximum sugar content ;

(c) breeding of specialised varieties of cane for different localities with the objects of extending the area capable of cultivation in cane and raising the yield of areas at present marginal ;

(d) study of the effects of cultural practices and fertilizer treatment on the yield of cane, and dissemination of the knowledge obtained from such studies ;

(e) study of the physiology of the cane plant, in order to ascertain the factors associated with high yield and resistance to pests and diseases ;

(f) investigations into the control of weeds of cane fields, and dissemination of the information obtained from such studies ;

(g) propaganda and demonstration of up-to-date methods among small planters, with the object of raising their yields to the level attained by the estate and the large planters.

W. Allan,

30th November, 1951. *Director of Agriculture.*

Twenty-first Annual Report of the Sugarcane Research Station for 1950

Introduction

After four years of continuous records, the sugar crop has cultivated in the present season total of nearly 457,000 metric tons. The progressive upward turn of production after the 1944 and 1945 cyclone years has been of incommensurable benefit to the Colony, and there are good prospects of the 1951 crop carrying the curve still higher.

Good growing weather has prevailed on the whole, and the Colony was again fortunate this year in not suffering damage from tropical cyclones. The cane growth season started in December 1949 during a drought which had already been prevailing for four months. In the middle of January, a cyclone which passed 100 miles West of Mauritius, produced beneficial rains which brought up the rainfall of that month to normal. Precipitations were deficient in the North and West in February, but very plentiful all over the island in March.

The credit for the high cane yields per arpent in 1950 cannot be entirely given to the favourable season experienced. The varietal component is undoubtedly of the utmost importance, and should not be overlooked or underestimated.

The cold and protracted winter was, on the whole, favourable to cane maturing, and the average sugar extraction worked out to 12·27, as against 12·4 the previous year.

Rainfall figures for three Stations, in the dry, intermediate and high rainfall localities, and temperature data for Reduit, are given in the following table. Meteorological statistics, supplied by the Acting Director of Observatory, have also been used in drawing up the above brief weather report :—

Months	*Rainfall (inches)*						*Temperature at Reduit Departure from normal* °C
	Experiment Slation Pamplemousses		*Central Experiment Station Reduit*		*Royal College Curepipe*		
	Average	*Registered*	*Average*	*Registered*	*Average*	*Registered*	
November 1949	2·13	2·36	2·33	2·68	5·71	8·11	−0·5
December 1949	4·91	1·69	6·37	4·09	9·71	4·09	−0·5
January 1950 ...	9·56	5·23	10·32	8·04	16·33	13·55	+0·1
February ...	8·74	2·40	10·95	3·26	17·28	14·52	−0·6
March ...	9·32	11·02	11·94	13·79	19·31	31·00	−0·6
April ...	5·96	6·57	5·41	10·46	12·39	20·76	−0·9
May ...	4·48	2·57	4·24	2·96	9·86	11·08	−0·9
June ...	3·43	2·43	3·11	4·05	7·47	11·03	0·0
July ...	2·93	1·55	2·75	3·17	8·57	11·03	−0·8
August ...	2·59	0·98	2·47	1·46	7·79	8·06	−0·1
September ...	1·83	0·76	1·71	1·54	5·78	6·28	−1·0
October ...	1·95	0·95	1·91	0·67	4·52	3·53	+0·2
November ...	2·13	0·18	2·33	4·77	5·71	3·79	−0·4
December ...	4·91	1·86	6·37	3·58	9·71	12·00	+0·2
TOTAL ...	64·87	40·55	72·21	64·52	140·14	158·83	−5·8

Various changes in staff personnel occurred during the year. Following the appointment of Mr. N. Craig as Acting Director of Agriculture in January, the writer was appointed Acting Officer in charge Sugarcane Research Station. Mr. E. Rochecouste, Acting Botanist, proceeded to England in July on two years study leave with the object of sitting for the London Honours degree in Botany. Mr. G. Mazery, Senior Field Demonstrator, left the Colony in June on six months leave, and was replaced by Mr. J. Marot, Field Demonstrator.

The vacancies in professional staff have not been filled during the year. The appointment of three Scientific Assistants, one for each of the Chemistry, Botany and Cane Breeding Divisions, and of a clerk on full-time services is still under consideration.

The work of the Chemistry and Botany Divisions was again handicapped by lack of key staff, due to the difficulties experienced in filling vacant positions. There has been, since July last, not a single officer in the latter division, and the routine work has been entrusted to Mr. B. Nundloll, Officer in charge of cultural methods. The activities of the Cane Breeding Division have been maintained at a high level, but an extension of field work and research will be contemplated when a Scientific Assistant is appointed.

A meeting of the Sugarcane Research Station Advisory Committee was called on July 26th, 1950, to discuss the Annual Report of the Station for 1949 and the research programme for 1950.

On the 12th January, 1950, the new premises erected to accomodate the offices and laboratories of the Sugarcane Research Station, and the library of the Department of Agriculture, were inaugurated by His Excellency Sir Hilary Blood, K.C.M.G., in presence of a gathering representative of the staff and of various institutions linked with the sugar industry of the Island. Speeches were delivered by Mr. W. Allan, O.B.E., Director of Agriculture, Mr. N. Craig, Deputy Director of Agriculture and Officer in charge Sugarcane Research Station, and His Excellency the Governor. Refreshments were then served to the guests.

The new building which covers an area of 4,000 square feet, was erected by the Public Works Department in about six months. It is spacious, and consists of walls strong enough to support an upper storey; the partitions have been made in such a way that they can be altered if necessary.

The Sugar Industry Reserve Fund Committee have kindly made a grant of Rs. 6,300 to the Station for ordering from the United Kingdom certain items of capital equipment. The items, some of which have already been received, comprise, *inter alia*, the following : an electric still, a torsion balance for the rapid weighing of small leaf samples, an electric muffle furnace, a photoelectric colorimeter for rapid analytical work, an electric centrifuge, a refrigerator for pollen storage experiments, and a set of sprayers for chemical weed control investigations.

These items contitute a useful addition to the existing equipment of the Station, and will allow of a greater volume of research being conducted when the scientific staff is at full strength. The Station is very thankful to the S.I.R.F. for their generous contribution.

* * *

The number of visits to the Station reached a higher level than the previous year, and was as follows :—

From Madagascar :—Prof. J. Millot and Dr. R. Paulian, Director and Deputy Director of the Institut de la Recherche Scientifique de Madagascar, Mr. P. Segalen, one of the Pedologists of the Institute and Mr. R. Ferrier.

From Reunion :—Messrs. Chatel, C. de la Giroday, D. Payet, P. Carrere, A. Mariotti and A. Rippert.

From France :—Messrs. A. Bernard and A. D. de Marigny.

From Mauritius :—Mr. P. G. Anthony, President, Chamber of Agriculture.

The Station was also honoured by the visit of Drs. H. H. Dodds, and K. Douwes Dekker, and Messrs. W. T. Robbins and J. B. Grant, South African delegates to the Queensland Congress of Sugarcane Technologists. They were taken round a comprehensive tour of the Island, and visited the Department of Agriculture, the Sugarcane Research Station, sugar estates and factories and various other places of interest. They were entertaincd to lunch on several estates.

* * *

A detailed account of the work of the four divisions of the Station is given in parts I to IV of the Annual Report. It is only necessary in these brief introductory remarks to epitomise the main results achieved by each division.

Weather conditions were, on the whole, unfavourable for cross-pollination work and fuzz germination in 1950. Shortage of arrows prevented the crossing programme being carried out as contemplated, and fuzz fertility was rather low, so that fewer seedlings than usual could be raised.

Interest in the breeding work centres on the production of hybrid seedling canes for specialized localities and particularly for the superhumid localities of the cane area, but one of the goals will be also to produce varieties to meet other specific needs, instead of relying on general-purpose canes.

A large number of variety trials was harvested during the crop season, the results showing that some of the Barbados cane varieties and E. 1/37 may be able to compete with M. 134/32 successfully. The Sugarcane Research Station is conscious of the danger of virtual dependence on one variety, namely, M. 134/32, which occupies over 95 per cent of the cane lands, and every effort is being made in search of new varieties.

M. 423/41, derived from M. 134/32, was released for general distribution. A large amount of planting material was supplied to planters, and it is gratifying to record the interest shown in this new variety by the planting community. The good qualities of this cane should not blind us to its limitations, which are its relatively low sugar content and poor juice qualities.

The release of M. 213/40, also a daughter of M. 134/32, and of E. 1/37, is under active consideration.

Several new cane varieties have been imported from Canal Point, U.S.A., and are undergoing quarantine in the greenhouse at Reduit.

Following the recommendations of the Plant Pathologist of the Department of Agriculture, Mauritius, these new introductions will have to be studied in the greenhouse for a full period of two years prior to their being released for testing in the open. The importation of other varieties, such as P.O.J. 3016, H. 32–8560, H. 33–1937, a few of the Queensland canes, etc, will be contemplated as soon as the first batch of canes will have been dealt with.

The factorial NPK experiments harvested in fourth ratoon by the Chemistry Division showed that an increase of 36 per cent in yield of sugar was obtained following applications of nitrogen at 30 Kilograms per arpent, and that an extra dressing of 30 Kilograms of nitrogen produced an additional increase of only 13 per cent in yield of sugar. The average responses to phosphate and potash were of the order of 0·7 and 1·3 tons of cane p.a. respectively. A marked falling off in the sugar content of canes receiving high doses of nitrogen was noticed, but phosphate and potash did not appear to affect the sucrose content adversely.

A single application of basalt dust at 182 tons p.a. before planting resulted in an increase of 15 tons of cane p.a. for three consecutive crops. It must be borne in mind that experiments on crushed basaltic rocks are necessarily of a long-term nature and should be repeated in ratoons to assess the cumulative effect of the basalt on cane yields with which is bound up the whole economic aspect of the problem.

Work in the Botany Division had to be considerably curtailed due to acute staff shortage. No new experiments on chemical weed control have been laid down. Experiments on the use of several brands of disinfectants in the pre-treatment of sugarcane setts were continued, the results confirming those obtained in the previous years. Trials laid down to determine the effects of interplanting foodcrops with sugarcane have been reaped, the data obtained being, in some cases, different from those collected previously.

Field trials on secondary crops, comprising oats, linseed, sweet potato, rice, etc., have been planted. Variety-and-time-of-planting, and spacing trials have been harvested with interesting results. The propagation of several grain sorghums is being pursued.

Apart from their normal duties, the Field Demonstrators of the Extension Service were called upon to make enquiries respecting the delivery of permits to shopkeepers for the sale of fetilizers direct to vegetable growers in the various districts of the Colony. Advice was in addition given to these growers regarding the detection of pests and diseases and methods of combating them.

It should be emphasized that peasant farmers are, as a result of the activities of the Service, becoming more and more conscious of the necessity of including phosphatic fertilizers in their fertilization programme. Demands for phosphatic guano have increased to such an extent that existing market stocks are proving inadequate, and importers are being persuaded to increase their importations.

It is also interesting to record that small planters are realising the benefits derived from mechanical cultivation of sugarcane and, it is hoped, that the demonstration work now in progress will soon bear fruit.

The Extension Service took an active part in the distribution of the variety M.423/41 to planters, and the writer wishes to state his deep appreciation of the measure of assistance accorded by officers of this Division, particularly the Acting Senior Field Demonstrator.

The work of the Sugarcane Resarch Station has, as usual, been conducted in an atmosphere of close cooperation with the planting community and Officers of the Department of Agriculture. The volume of work, particularly routine work, has run high despite the staff inadequacy, but in order that this work may be brought to a successful end, there must be no slackening of effort.

A. DE SORNAY,
Acting Officer-in-charge,
Sugarcane Research Station.

PART I—CANE BREEDING DIVISION

Cane Breeding—M./50 Series

Climatic conditions were, on the whole, unfavourable for hybridization and seed setting in 1950. There was a scarcity of arrows in the breeding plots, particularly at Pamplemousses, where the crossing programme had to be curtailed considerably.

Crossing was carried out at Reduit and Pamplemousses during the period May—August. The number of crosses made was as follows :—

	Type of Cross			
	Lantern	*Bag*	*Open*	*Totals*
Reduit	153	0	6	159
Pamplemousses	5	16	5	26
TOTALS	158	16	11	185

Single-arrow lanterns of an improved design were made for use at Pamplemousses. The sides are 6 inches longer than those of the standard lanterns, so that there is no necessity to adjust the height of the lantern as the stalk of the female arrow grows in length. There is, in addition, more room for the male arrow which can be inserted well vertically above the female arrow. The diameter had to be reduced a little to prevent an increase in the lantern's weight. It must be emphasized that lightness is one of the primary requisites of the single-arrow lantern, so that it may be erected on one bamboo pole. The bamboo-lantern system is necessarily top-heavy and the lantern's weight has to be kept down to reduce the risk of falling over due to wind action to a minimum.

A certain number of crosses had to be made in bags instead of in lanterns at Pamplemousses because there were so few arrows available in the breeding plot, that crosses had to be made in planters' fields in the vicinity where the lanterns could have been stolen.

The cross-pollination work involved more or less the same parental varieties as in 1949. No new varieties could be utilised due to the fact that the canes recently imported from overseas are still undergoing quarantine in the glasshouse at Reduit.

Promising crosses have had to be replicated to provide large hybrid seedling populations at Reduit, Hermitage and Pamplemousses. The Barbados varieties B. 34104, B. 37161, B. 37172 and B. 3439 appeared in a certain number of matings, but could not be used as extensively as the previous year due to shortage of arrows. They, in general, proved less prolific than in 1949. The variety E. 1/37 occurred in many crosses, the main object in using this variety being to try to produce seedling canes adapted to the poor leached soils of the superhumid areas of the Colony. Crosses of the fourth nobilized glagah type could not be made as contemplated due to paucity of arrows.

Stand over R.P. 8 canes at Pamplemousses did not arrow. These canes were very tall when the flowering season commenced, and had not been cut the previous crop to study the effect of senescence in inducing flowering in this variety.

Breeding Plots.—The plot of female parent varieties in Field 3 at Réduit having proved very unprolific, due probably to high soil fertility and too much protection from the prevailing winds, a second plot was established in Field 8, where the soil is poor and the canes are well exposed to the wind.

The size of the breeding plot of male varieties in Field 9 was increased to accommodate proven parent varieties and new varieties when available. The aim in planting more of the proven varieties is to have sufficient male arrows for the local breeding work and an ample supply of pollen for export to South Africa for crossing purposes.

Fuzz fertility was, on the whole, lower than normal. A large number of crosses produced very few or no seedlings at all, purticularly towards the beginning and end of the crossing season.

The seedlings in the greenhouse at Réduit made slow growth due to the cold and protracted winter and, as a result, transplanting to pots was considerably delayed. This suggests that the greenhouse should be heated at night during abnormally cold winters, the more so that fuzz germination is undoubtedly adversely affected by low temperatures.

Damping-off disease occurred to a certain extent at Réduit despite a careful control of waterings, and many seedlings were lost. The disease was not in evidence at Pamplemousses. At Reduit, the mixture of soil and pen manure for planting the fuzz had to be heated on tin sheets instead of being steam-sterilized as customary, the sterilizer being out of order.

The table below shows the extent of the breeding work, the number of seedlings raised and the number planted in the field:—

Nature of Cross	*Number of crosses made*	*Number of seedlings obtained*	*Number of seedlings planted in the field*		
			C.E.S	*P.E.S.*	*H.E S.*
1. Between noble canes	1	8	7	—	—
2. 2nd Nobilized *S. Spontaneum* ...	1	4	—	—	—
3. 3rd Nobilized *S. Spontaneum* ...	2	54	54	—	—
4. 4th Nobilized *S. Spontaneum* ...	12	866	695	—	—
5. 5th Nobilized *S. Spontaneum* ...	13	112	102	—	40
6. Mixed *S. Spontaneum* crosses ...	118	19,957	4,606	6,000	7,118
7. Crosses involving several *Saccharum* species	38	2,164	513	962	16
TOTAL	185	23,165	5,977	6,962	7,174

Total number of seedlings planted in the field : 20,113

Seedlings raised at Reduit were sent in the box stage to Hermitage and Pamplemousses for potting out. All seedlings obtained at Pamplemousses were planted in the field at that Station, and none sent to Reduit or Hermitage. A few thousand seedlings potted at Reduit were transported to Hermitage in a Station Waggon.

Experiments conducted at the Central Experiment Station, Reduit, for the past two years, have shown conclusively that seedlings can be transplanted to pots direct on the concrete beds in the nursery, instead of transplanting in the greenhouse and transferring to the nursery after 7 to 10 days. For that purpose, half of the seedlings from several crosses was potted out in the greenhouse as usual, and half direct on the beds. There was no apparent difference in the growth of the seedlings whether in the greenhouse or nursery, and the percentage of seedlings which died off after potting was about the same. Potting seedlings in the nursery instead of in the greenhouse is not only labour saving, but also avoids congestion in the latter, a factor of some importance when one and the same glasshouse is being used for raising seedling in pans and in pots.

A small glasshouse to accomodate about 3,000 potted seedlings was erected by the Public Works Department at Hermitage following the recommendations made the previous year. Seedlings were transplanted to pots in this glasshouse and then transferred to the stone beds in the nursery when 5 to 6 inches high. The last batches potted out were left in the glasshouse until ready for transplanting in the field. It is needless to stress that these seedlings made excellent growth and looked very healthy at the time of transplanting.

It is also interesting to record that mortality in the nursery was very greatly reduced by transplanting to pots in the glasshouse first. The spectacular losses of the previous year, due to potting direct in the nursery, were reduced to insignificant figures, and thus larger numbers of seedlings could be planted in the field in the case of certain crosses.

First Year Trials

(i) Virgins—M./50 Series. The field plantations of the 1950 seedlings commenced during the first half of December at all three centres, but could not be completed by the end of the year at Reduit and Pamplemousses due to shortage of irrigation water. The weir on Deep River which impounds water for irrigation at the Central Experiment Station, and the canal leading the water to the experimental plots have been cleaned, and there is now a sufficiency of water for irrigating the newly planted seedlings. A scheme is afoot for replacing the main canal from Maison Blanche dam to the Pamplemousses Experimental Station by a pipe, but it will not materialize before 1951.

Field observations made at Hermitage during the year under review confirmed previous findings that it is better to plant in the field only the well established seedlings and to keep weaklings for supplying blanks. To ensure good stands in the seedling plots, this practice must be coupled with that of interplanting maize with the hybrid seedling populations to reduce borer incidence to a minimum.

As in 1949, large populations from promising crosses were planted at the Experimental Stations in order to increase the odds of coming across superior offspring combining valuable commercial characteristics.

In the light of previous findings, the adopted planting distances in the seedling plots were as follows :—

Réduit and Hermitsge	3½ feet × 5 feet
Pamplemousses	3½ feet × 4½ feet.

Wider spacings, although desirable, cannot be recommended for the present due to shortage of ground space.

(ii) *Virgins—M./49 Series.* The 1949 plant cane seedlings at Reduit and Pamplemousses could not be selected owing to land shortage for laying down second trials. The seedlings at Pamplemousses had grown well, but those at Reduit were backward, particularly in certain fields. Selection at Hermitage will be made in July or August, 1951. As

already mentioned in previous reports, it takes nearly two years to get a mature crop of seedlings at Hermitage, but it is hoped that, now that the transplanted seedlings are having a good start, it will be possible to harvest the populations at the end of the planting year, and to select on the ratoon. This will be advantageous, particularly during cyclone years.

(iii) *Virgins—M./48 Series.* The seedlings at Hermitage were selected in August, and 100 seedlings, equivalent to 1·4 per cent of the populations, retained for planting direct in second trials there. These populations having had a satisfactory start, few gaps were observed at harvest, and it will now be possible to assess the value of particular crosses capable of yielding good seedling canes for the high rainfall localities of the Island, and to eliminate certain crosses through failure to yield offspring of promise. Previous stands were too gappy to allow of parental lines being properly gauged.

Some of the selected seedlings had comparatively high Brix, and it is expected that they will prove to be early maturing varieties adapted to the Hermitage soil and climatic conditions.

The seedling populations were uprooted after harvest as they had already been occupying the ground for nearly 20 months.

(iv) *Ratoon—M./48 Series.* Selection from the 1948 ratoon populations was made in August at Réduit and in September at Pamplemousses, and 175 seedlings, or 1·3 per cent of the populations, selected out of 13,607, and planted in second trials at these stations. More seedlings could have been selected had more land been available at both stations.

Second Year Trials

1. *Trials laid down.* Three large trials including 275 selected seedlings have been laid down, 1 at Réduit, 2 at Pamplemousses and 1 at Hermitage, to test seedlings of the M./46 to M./48 series against M. 134/32. The new method of layout, described at length in the Annual Report for 1949, has been used for these trials; it has been decided as much by practical considerations as by any statistical evidence, but is still in an experimental stage.

There are already two years that the new design is being tested, and experience acquired so far indicates that it is satisfactory, particularly when the ratoons' results are considered, due to the lesser interaction between seedlings canes of different growth vigour. Border effect has also been reduced in plant cane in some of the trials by increasing the planting distance between the rows. A great advantage of the new layout is the sounder comparison between the canes under trial and the standard variety which occurs several times in each block. However, more data covering several years are necessary before the new design can be adopted for the routine second trials.

2. *Trials harvested.* Forty-four second trials have been reaped, 15 in virgin and 29 in first ratoon, and 49 seedlings selected therefrom for furhter trial. The seeedlings selected at Pamplemouses have been planted in third trials, and those selected at Hermitage in propagation plots. No selection was made at Reduit. Some of the varieties selected at Hermitage appear to show considerable promise.

The policy regarding second trials is to select from first ratoon in the case of the old design and from second ratoon in the case of the new design. Selection from second ratoon is more practical than from first ratoon, as the seedling planted in third trials will probably be better ratooners.

Owing to staff inadequacy the Brix of second trials could not be taken at the beginning and middle of the crop as intended to determine which of the varieties under test are early or medium maturing.

Third Year Trials

1. *Trials laid down.* Six third trials have been planted in 1950, 4 at Pamplemousses and 2 at Hermitage, to test seedling canes of the M./45 and M./46 series against M. 134/32. One of the trials laid down at Hermitage also includes E. 1/37 as standard variety.

No third trial was planted at Reduit due to the fact that all seedlings in second trials have to be tested in second ratoon.

2. *Trials harvested.* Eight trials have been harvested during the crop, 2 at Reduit, 5 at Pamplemousses and 1 at Hermitage. Seven of the trials were in plant cane and one in first ratoon. No varieties were selected for testing in variety trials.

Some of the seedlings appearing in these trials, particularly those of the M./44 series, gave remarkably good results in virgin compared to M.134/32. They not only produced higher yields of cane and sugar, but their juice purities and *richesse* compared very favourably with those of the standard variety. Needless to say that their ratooning capacity has to be assessed before it can be decided whether they are likely to be of commercial value.

There was no change in the methods used for laying down and harvesting the third trials plots.

Variety Trials

1. *Trials laid down.* Only 9 variety trials have been planted during the year, in view of the large number of trials already in existence. The varieties occuring in these experiments are: new seedling canes bred by the Sugarcane Research Starion, the most promising of the six Barbados varieties and E. 1/37. The variety E. 26/42 being susceptible to Red Rot was not included in these trials.

The variety M. 11/43, which gave out standing results in ratoon in a third trial at Pamplemouses, was planted in two variety trials in the North of the Island. One of these trials has been laid down on an estate with irrigation, and the other in a very dry locality where no irrigation water is available. The latter trial also includes E. 1/37 whose performance under dry conditions is being investigated.

Field observations made in November, i.e., during a dry spell, showed that M. 11/43 appears susceptible to drought, but not to the same extent as E. 1/37. They add support to the view held so far that the latter variety appears unsuitable for cultivation in the dry areas of Mauritius.

A trial containing E. 1/37, B. 34104, B. 37161, M. 134/32 and B.H. 10/12 (as standard) was planted at Mon Desir S.E. in the district of Black River. This estate is the only stronghold of B.H. 10/12 in the Colony at present; on all other estates of the same district and of other districts, this variety has been giving progressively lower yields and has been completely ousted by M. 134/32. Abundance of irrigation water may be one of the reasons why it has maintained its supremacy at Mon Desir. It will be interesting to find whether any serious competitor with B.H. 10/12 can be sorted out from the newly planted variety trial.

In pursuance of the breeding policy regarding the production of special types of canes for the poor leached soils of the uplands, seedling canes having given good accounts of themselves in preliminary tests at Hermitage Experimental Station, have been planted in trials at Alma and in rainy parts of Britannia and St. Aubin Sugar S. E., E.1/37 and M.134/32 appearing as standards.

Trials harvested. Fifty one variety trials have been harvested during the crops season, 13 in plant cane and 38 in ratoons (first to third), as compared with a total of 44 the previous year.

The reaping of these trials took place as scheduled and without inconveniences due to the cooperation of estates managers. Three trials were cut, without the plots yields being recorded by the estate themselves through an oversight. The use of addiators for recording plot yields facilitated the work of the officers engaged in reaping the trials.

Growth and maturation conditions having been satisfactory on the whole, cane yields have generally been running high and good juice qualities have been met with. The favourable weather conditions have probably enhanced the performance of the seedling canes under trial.

The yield data collected during the year under consideration are more valuable than those obtained in 1949 due to the higher proportion of ratoons reaped. At the request of the Sugarcane Research Station Advisory Committee, some of the trials containing released varieties have been harvested in third ratoon, and may be continued in fourth and possibly fifth ratoons, so that a concrete knowledge of the ratooning power of these canes may be obtained prior to their being propagated on a large scale on sugar estates.

Variety trials harvested are detailed under six sub-sections as per the following :—

(*a*) *M. 213/40 and M. 423/41.* The results obtained with M. 213/40, in comparison with M. 134/32, in a large number of tests in plant cane and ratoons, covering six years, are summarized hereunder :—

	Variety	*Virgins (mean of 31 trials)*	*1st Ratoon (mean of 27 trials)*	*2nd Ratoon (mean of 13 trials)*	*3rd Ratoon (mean of 5 trials)*	*Average (mean of 76 tests)*
Tons cane per arpent	M. 213/40 ...	43·3	41·3	42·8	46·7	42·7
	M. 134/32 ...	34·9	34·4	34·8	36·0	34·8
	Difference ...	+ 8·4	+ 6·9	+ 8·0	+ 10·7	+ 7·9
	Per cent ...	24·0	20·0	22·9	29·7	22·7
Juice Purity per cent	M. 213/40 ...	80·7	84·2	84·9	86·7	83·0
	M. 134/32 ...	83·6	86·5	87.0	87·5	85·5
	Difference ...	− 2·9	− 2·3	− 2·1	− 0·8	− 2·5
C.C.S .per cent cane	M. 213/40 ...	11·8	12·8	13·1	13·1	12·4
	M. 134/32 ...	12·6	13·3	13·6	13·0	13·0
	Difference ...	− 0·8	− 0·5	− 0·5	− 0·1	− 0·6
Tons C.C.S. per arpent	M. 213/40	5·07	5·30	5·60	6·11	5·31
	M. 134/32 ...	4·52	4 61	4·73	4·69	4·60
	Difference ...	+ 0·55	+ 0·69	+ 0·87	+ 1·42	+ 0·71
	Per cent ...	12·10	14·90	18·30	30·20	15·40

Canes from nine propagation plots of M. 213/40 were bulked for factory crusher juice analysis under the supervision of the Sugar Technology Division of the Department of Agriculture. M. 134/32 canes of the same category, and growing under as similar conditions as possible, were also analysed for comparison purposes. The canes crushed comprised both virgins aud ratoons. The results of the milling tests are the following : —

	M. 213/40	*M. 134/32*	*Difference*
Juice Purity %	84·8	88·3	− 3·5
Fibre % cane	10·95	12·25	− 1·30
C.C.S. % cane	12·25	12·87	− 0·62

In two of these tests, M. 213/40 gave much lower juice purities than M. 134/32. In one case, the low figure obtained is probably due to the fact that the canes crushed were young immature virgins.

The average juice purity of samples collected from variety trials, distributed in space and time, is probably more reliable than the factory tests results due to the high number of samples analysed (76) and to a better comparison between the samples of M. 213/40 and those of the standard variety.

Considering all the results obtained with M. 213/40 so far, the following conclusions may be drawn regarding its performance :—

(a) It has considerably surpassed M. 134/32 In yield of cane and sugar in plant cane and ratoons.

(b) It has, on the whole, poorer juice qualities than M. 134/32.

All the results obtained up to the end of 1950 will be submitted for scrutiny by the Cane Release Committee.

Cases of "stem deterioration" have been noticed on M. 213/40 in three variety trials, and healthy and diseased cane samples taken and analysed at the request of the Plant Pathologist of the Department of Agriculture. The data obtained are two fragmentary for one to arrive at definite conclusions regarding the final effects of the disease, but it would appear that it results in lower juice purities.

Healthy and diseased portions of the stalks were also sampled and analysed separately. The differences in juice purity and C.C.S. were more pronounced than for whole canes, but it is considered that the figures obtained are of little significance, as the diseased portions accounted for a small percentage of the stalks, and were therefore of little value in assessing the magnitude of the damage due to tissue necrosis.

It would appear that there is a certain connection between arrowing and stem deterioration in that particular variety. Arrowed and non-arrowed canes were split transversely and examined. All the arrowed canes showed symptoms of necrosis, but the great majority of the non-arrowed canes was disease free. In the arrowed canes, the degree of necrosis was higher at the top than at the bottom of the canes, a fact which may show a certain relationship between the disease and arrowing.

* * *

M. 423/41 having been released during the 1950 crop, only the results obtained in variety trials in second and third ratoons will be given. These are as follows:—

Varieties		*Second Ratoon (mean of 5 trials)*	*Third Ratoon (mean of 2 trials)*
Tons cane per arpent	M. 423/41	34·79	35·81
	M. 134/32	31·17	34·27
	Difference	+ 3·62	+ 1·54
Juice Purity %	M. 423/41	86·40	83·20
	M. 134/32	88·10	85·20
	Difference	− 1·70	− 2·00
C.C.S. % cane	M. 423/41	13·70	12·40
	M. 134/32	14·50	12·80
	Difference	− 0·80	− 0·40
Tons C.C.S. per arpent	M. 423/41	4·79	4·04
	M. 134/32	4·53	4·39
	Difference	+ 0·26	− 0·35

The above figures tend to show that M. 423/41 ratoons as well as M. 134/32, but that its juice qualities were, in these trials, not as good as those of M. 134/32. The study of the performance of this variety in older ratoons will be pursued.

No factory tests on M. 423/41 were made during the past crop.

(b) Barbados Varieties. A large number of trials including these varieties has been reaped in 1950, three of which were in second ratoon and the remainder in virgin and first ratoon.

The results of the three trials harvested in second ratoon at the Experimental Stations are the following :—

Trial 192—Hermitage. B. 3337 was significantly superior to M. 134/32 in yield of cane and sugar, and B. 34104 and B. 37172 significantly inferior. There was no significant difference between B. 37161 and the standard. B. 3439 and B. 4098 were too poor to be weighed and analysed.

Trial 193—Reduit. B. 3337, B. 37161 and B. 37172 were superior M. 134/32 in yield of cane, but B. 37172 was the only variety to have outclassed the standard in yield of sugar. There was no significant difference in yields of cane and sugar between B. 34104, B. 4098 and M. 134/32. B. 3439 was very bad.

Trial 194—Pamplemousses. There was no difference between any of the six varieties under test and M. 134/32.

The following conclusions may be drawn regarding the performance of the Barbados varieties in first ratoon. B. 3337 is the only variety having beaten, by a certain margin, M. 134/32 in yield of cane and sugar. It appears to crop well even in the superhumid zones of the Island, and it will be interesting to study its performance in comparison with E, 1/37 in the uplands. It has, so far done very well at Sans Souci and Union Park which have high rainfall. B. 34104 yields well in first ratoon, has good juice and is probably one of the best of the B canes for all round purposes ; it appears resistant to drought. B. 37161 gave much better yields in plant cane than in first ratoon due perhaps to the fact that it tillers badly. It is a very fast grower and may yield progeny of value when mated with some of the Mauritian varieties. B. 37172 has given satisfactory results in many tests, but there is nothing particular to mention about it. B. 9048 and B. 3439 are unsuitable to our conditions, particularly the latter which is exceedingly poor under the the varying conditions of the tests.

(c) E. 137. This variety is being studied in view of its probable release for commercial growing. The average results obtained in virgin and first ratoon in variety trials, under a diversity of environmental conditions, are summarized below :—

	Varieties	*Virgins (mean of 10 tests)*	*1st Ratoon (mean of 7 tests)*	*Average (mean of 17 tests)*
Tons cane per arpent	E. 1/37	31·75	32·87	32·19
	M. 134/32	31·14	31·64	31·34
	Difference	+ 0·61	+ 1·23	+ 0·85
Juice Purity per cent	E. 1/37	87·30	89·70	88·20
	M. 134/32	86·10	88·40	87·00
	Difference	+ 1·20	+ 1·30	+ 1·20
C.C.S. per cent cane	E. 1/37	13·50	14·20	13·80
	M. 134/32	13·20	13·80	13·40
	Difference	+ 0·30	+ 0·40	+ 0·40
C.C.S. per arpent	E. 1/37	4·40	4·60	4·48
	M. 134/32	4·17	4·38	4·25
	Difference	+ 0·23	+ 0·22	+ 0·23

Milling tests made on virgin and ratoon canes at Highlands S. E. in co-operation with the Central Board of the Department of Agriculture, are the following :—

	E. 1/37	*M. 134/32*	*Difference*
Juice Purity per cent ...	91·9	90·0	+1·9
Fibre per cent cane ...	11·09	10·44	+0·65
C.C.S. per cent cane ...	14·02	13·43	+0·59

There is fairly good agreement between the average juice purity of samples from variety trials and that of the milling test, and the figures show that the juice purity and sucrose content of E. 1/37 compare very favourably with those of M. 134/32.

E. 1/37 appears particularly suited to the higher rainfall localities of the Colony, but in the drier localities the results of several variety trials tend to show that, although it yields less than M. 134/32, its sugar output per arpent approaches that of M. 134/32 due to its higher *richesse*. Under irrigation at Medine S. E. it has been beaten by M. 134/32 in plant cane and first ratoon.

(*d*) *New M. seedling canes.* Several trials laid down in 1949, to test seedlings of our own raising, were reaped during the crop, with varying results. The most promising cane appearing in these tests is M. 311/41, which does well in virgins under high rainfall or irrigated conditions.

(*e*) The trial with split-plots at Benares S. E. to test the responses of M. 213/40 and M. 423/41 to normal and double dressings of nitrogen was reaped in first ratoon, the results showing that no advantage accrued from a higher dose of nitrogen. In plant cane there were some slight yield increments which were probably non-significant.

In both plant cane and ratoon, a double dose of nitrogen had a markedly depressing effect on the juice purity of M. 213/40 and and M. 423/41, but practically none on that of M. 134/32.

The experiment laid down at Reduit by the Chemistry Division of the S. R. S., to study the response M. 423/41, in comparison with M. 134/32, to high fertilization, was reaped during the year the results being given in Part II of the Annual Report to which the reader is referred.

(*f*) The trial planted at Tamarin S.E., two blocks of which had been laid down in one part of the estate, and two blocks in another part, under different rainfall conditions, could not be harvested, severe damage having been caused by monkeys a few months after planting.

Release of M.423/41

The variety M.423/41 was released for general distribution during the year under review, and there were heavy demands for planting material from planters and millers. The distribution commenced in August and covered the whole crop period. Canes cut from propagation plots on the larger estates, and at Richelieu, Reduit, Hermitage and Pamplemousses Experimental Stations, and from variety trials, were used for distribution. A total of over 185,000 canes had been supplied to applicants all over the Island by the end of the year.

Other Investigations

1. *Control of Arrowing.* The series of experiments started to investigate the effects of high phosphate dressings, in combination with nitrogen, on flower induction in B.H. 10/12 gave negative results. There were very long canes in the experimental plots when the arrowing season commenced, but not a single cane showed signs of flowering. The canes, though tall, have not been reaped, and allowed to stand over in the hope of obtaining arrows next year.

2. *Aretan as a Preservative for Male Arrows.* Investigations on the use of Aretan solutions, at varying concentrations, as a preservative for male arrows, were carried out on a small scale, with promising results. Arrows of P.O.J. 2878, D. 109 and M. 99/34, cut with three to four feet of stalk, were allowed to stand in Aretan solutions of concentrations ranging from 0·10 per cent to 0·03 per cent, 0·03% SO_2 solution being used as control. Nodes were cut on every second day as is usually practised for male arrows required for breeding purposes.

Daily observations revealed no appreciable differences in the pollen shedding and longevity of the arrows kept in Aretan solution as compared with those kept in ordinary SO_2 solution. Pairs of crosses were therefore attempted with the male arrows dipping in Aretan and SO_2 solutions respectively, with satisfactory results. There were no indications of the fuzz fertility having been impaired by the Aretan; there was also no difference in the growth of the seedlings derived from crosses made with the male arrows in Aretan and SO_2.

These investigations which have been made at the suggestion of the Senior Field Demonstrator, will be repeated on a wider scale next year and will be made to comprise a large number of male parent varieties.

3. *Effect of Source of Planting Material on Cane Yield.* The three 5 × 5 Latin squares laid down at Reduit, Hermitage and Pamplemousses, to determine whether yield of cane and sucrose can be correlated with the source of planting material of M. 134/32, were harvested. Brix samples were taken with the Zeiss hand refractometer.

The cuttings from Hermitage gave significantly lower yields of cane at Reduit and Hermitage. At Pamplemousses, the cuttings from Hertitage also produced the lowest yield of cane, but the differences in yield from the other sources did not reach significance at the P=0.05 level, due probably to a higher experimental error.

The cuttings from St. Antoine S.E germinated well and gave rise to good cane yields despite the fact that they were badly infested with borers.

The lowest cane yields produced by the planting material from Hermitage may be ascribed to a lower plant food content of the cuttings, the locality being notable for mineral soil deficiencies, which may be reflected in the cuttings.

There was no statistical difference between any of the sources as regards the percentage of total solids in the juice.

The Latin Squares are being continued in first ratoon to see whether there is any repetition of the plant canes' results.

Export of Cane, Fuzz, etc.

A few cuttings of several local seedlings canes have, on request, been exported by air to the following countries: India, Pakistan, Ceylon, Natal, Reunion and Madagascar. Cuttings of several other varieties have, in addition, been despatched to Reunion and India for breeding purposes. Applications for planting material of several varieties for export by sea to one or two countries could not be dealt with due to shipping difficulties.

No fuzz could be sent by air mail to Egypt and Pakistan due to shortage of arrows and the consequent reduced number of crosses that could be effected.

Specimens of pots of cane leaves used for potting first year seedlings in Mauritius have been despatched by air to Mount Edgecome Experiment Station, Sonth Africa, at the request of Dr. H. H. Dodds who visited the country on his way to Australia.

Imported Varieties

The following varieties have been introduced from Canal Point, U.S.A., and planted in the quarantine greenhouse at Réduit: C.P. 34–120, C.P. 36–13, C.P. 36–105, M. 336, M.L. 3–18 and P.R. 905. The cuttings of C.P. 34–120 were destroyed after reception, as this variety had previously been introduced from South Africa. The C.P. canes were re-exported to Mauritius by the Canal Point authorities on their being informed that the previous consignment had to be destroyed.

The second generation of C.P. 34–120, Co. 419 and Co. 421, received from South Africa towards the end of 1949, was established in the greenhouse.

Importation of other varieties could not be comtemplated due to lack of accomodation in the quarantine greenhouse at Reduit whose four compartments are occupied by the varieties received in November 1949 and January 1950.

A. DE SORNAY,
Plant Breeder.

PART II—CHEMISTRY DIVISION

The research work of the Division was once more handicapped by shortage of staff which continued throughout the year under review.

The writer had, therefore, to give once more much of his time to the routine work of the Division which consisted mainly in the upkeep of two series of factorial experiments, in the control of all cultural operations and fertilizer applications, sampling and subsampling of leaves for foliar diagnosis, down to the harvesting and weighing of the canes from the experimental plots.

The first series deals with the factorial 3N × 3P × 3K experiments which were undertaken in order to obtain foliar diagnosis data in connection with the correct and economic fertilization of sugarcane. These experiments were harvested in fourth ratoons and the results are presented in this report.

The second series consists of trials dealing with Lime, Potash and Magnesia applications. These trials are limited in their distribution to the humid and superhumid zones only. They were harvested in first ratoons.

In addition, a certain amount of analytical work was made possible during the latter part of the year, through the receipt of some of the necessary equipment for the new methods of analysis.

Fertilizer Trials on Estates

The number of 3N × 3P × 3K factorial experiments under the control of this Division amounted to sixteen, but the results of only thirteen trials will be presented in this report. One trial was damaged by fire early in the year, a second one received additional fertilizers through an oversight of the field Manager of the estate where that particular trial is located and a third one was harvested without the Station being informed, so that plot weights could not be recorded.

This type of experiment is not very popular with Estate Managers, due to the fact that some of the plots, in these trials, receive no fertilizer at all and their yields decrease to a considerable extent after a few years; moreover, the different levels of fertilization cause the plots to look very uneven in growth. Some experiments have, for this reason, been uprooted by the estate after the fourth ratoon crop.

The quantities and forms of fertilizers applied to these experiments were the same as for the previous ratoons. The tabulated results are presented in Table I and the statistical analysis of these results is given in Table II,

TABLE I

Tabulated Results of Factorial Fertilizer Trials (1950)

Locality	Category	Comparative Yield of Millable Cane								
		Nitrogen			Phosphoric Acid			Potash		
		ON	*1N*	*2N*	*OP*	*1P*	*2P*	*OK*	*1K*	*2K*
Bon Espoir	5th Ratoon	100	121	128	100	103	101	100	112	109
Britannia	4th Ratoon	100	119	129	100	113	111	100	99	112
Benares	4th Ratoon	100	138	130	100	97	97	100	97	101
Savinia	4th Ratoon	100	137	145	100	94	100	100	105	111
Riche-en-Eau	4th Ratoon	100	162	183	100	102	103	100	109	112
Beau Vallon	4th Ratoon	100	157	201	100	103	93	100	96	97
Union Flacq	4th Ratoon	100	147	169	100	98	101	100	110	132
Savannah	4th Ratoon	100	130	151	100	99	109	100	104	95
Mont Choisy	4th Ratoon	100	163	173	100	109	109	100	97	98
Pierrefonds	4th Ratoon	100	130	148	100	100	101	100	96	103
Deep River	4th Ratoon	100	122	143	100	93	103	100	93	99
Henrietta	4th Ratoon	100	184	189	100	103	114	100	94	95
Beau Champ	4th Ratoon	100	121	136	100	102	96	100	102	106
General Average		19·0	26·1	28·9	24·4	24·6	25·1	24·1	24·4	25·4
Comparative Yield		100	137	152	100	101	103	100	101	105
Vegetative Growth Index		100	118	127	100	101	102	100	102	103

TABLE II

Results of Statistical Analysis of Factorial Fertilizer Trials (1950)

Locality	*Linear Response*				*Curvature*				*Interaction*				*Standard Error % Mean*
	N	*P*	*K*	*Sig : diff : (20 : 1)*	*N*	*P*	*K*	*Sig : diff : (20 : 1)*	*NP*	*NK*	*PK*	*Sig : diff : (20 : 1)*	
Bon Espoir	+ 5·2*	+0·3	+1·8	±3·7	− 2·5	−1·0	−3·0	±6·3	−0·6	−0·7	−3·8	±4·5	17·3
Britannia	+ 6·2*	+2·6	+2·8	±3·8	− 1·9	−3·6	−3·3	±6·5	−1·5	−0·3	−1·3	±4·6	15·0
Benares	+ 6·5*	−0·7	+0·3	±4·0	−11·0*	+0·9	+2·1	±6·9	−1·2	−0·9	+0·6	±4·8	14·6
Savinia	+ 9·4*	+0·1	+2·7	±4·6	− 6·0	+3·0	+0·2	±7·9	+2·0	+3·5	−0·3	±5·6	17·3
Riche-en-Eau ...	+16·2*	+0·9	+2·9*	±2·2	− 8·0*	−0·1	−1·6	±3·8	+2·3	−0·8	+0·2	±2·7	7·6
Beau Vallon ...	+12·6*	−1·3	−0·5	±2·5	− 1·6	−2·5	+1·0	±4·3	+0·5	−1·1	+0·5	±3·1	13·1
Union Flacq ...	+13·4*	+0·3	+7·6*	±2·6	− 4·9*	+1·7	+2·8	±4·5	+1·9	+3·2*	+5·3*	±3·2	9·6
Savannah	+11·8*	+2·7	−1·4	±3·0	− 2·2	+3·3	−3·7	±5·2	+5·4*	+1·6	−0·3	±3·7	10·2
Mont Choisy ...	+ 7·8*	+1·3	−0·3	±2·1	− 5·6*	−1·5	+0·6	±3·6	+0·7	+1·8	−1·0	±2·6	13·5
Pierrefonds ...	+11·3*	+0·2	+0·9	±4·2	− 2·5	−0·1	+3·5	±7·2	−0·8	−0·6	+1·6	±5·1	14·2
Deep River	+ 8·4*	+0·8	−0·2	±2·9	− 0·2	+4·0	+3·1	±5·1	+1·3	0	−3·5	±3·6	12·2
Henrietta	+10·8*	+2·5	−1·0	±2·9	− 9·7*	+1·5	+1·1	±5·1	+2·6	+3·8*	−1·6	±3·6	15·2
Beau Champ ...	+ 8·6*	−1·0	+1·6	±2·3	− 1·5	−2·7	+0·7	±4·0	+2·1	−0·6	−2·5	±2·8	8·2
General Average	+ 9·9	+0·7	+1·3		− 4·4	+0·2	+0·3		+1·1	+0·7	−0·5		12·9

*Significant

Reference to the above tables shows that the response to Nitrogen fertilization is very high, amounting to almost 10 tons of cane per arpent, or a 52 per cent increase on the control.

Average responses to Phosphate and Potash are small (and almost negligible) for the series, thus indicating the very high status of estate soils in these elements, especially when it is considered that they have been withheld from the controls for five consecutive years.

If the results of the 5 crops are considered with a view to determining the effect which climate and soil type may bear on the response to fertilizers, the following may be deduced :—

First, the response to Nitrogen could not be correlated to either climate or soil type, as all types need this fertilizer.

The response to Potash, though small, seems general, but is lower in dry areas and higher in more humid areas. In 75 per cent of the cases, there is a positive but small response to Potash.

As far as Phosphate is concerned, except for the gravelly soils of the more humid regions where a constant response to this fertilizer is observed, most of the sugarcane soils seem to have a rather good supply of that element.

The response of our soils to Phosphate fertilization does not seem to be governed by climatic conditions, but depends solely on the previous fertilization which the soil received. Experimentation shows one positive but small response to phosphate in 30 per cent of the tests.

The situation on small planters' land is not as good, and being given the cheapness of phosphatic guano, it is essential that liberal amounts be applied so that these lands may be brought up to estate standard.

Potash fertilization too need be encouraged especially in high rainfall localities.

On the whole, there is little interaction between the major fertilizers, but it may well be mentioned that the NP interaction has been positive in 44 out of 75 cases, with an average of 0·5 ton of cane, whilst in 43 cases out of 75, there has been a negative NK interaction, amounting on the average to 0·4 ton of cane per arpent, which, it must be pointed out, tend to disapear in the old ratoons.

Use of Pen Manure

All the available and relevant data concerning the effect of pen manure were collected from the experiments under the control of this Division and the following figures, which are of a certain interest, are presented :—

	Pen Manure at 10 tons/arp.		*No Pen Manure*	
	Tons caue per arpent	*Comparative Yield*	*Tons cane per arpeut*	*Comparative Yield*
No N	23·9	100	22·4	100
30 kgs. N/arp.	29·6	124	30·2	135
60 kgs. N/arp.	30·8	129	32·4	145

The above figures are derived from a total of about 80 experiments

It is obvious, from the above figures, that where and when a normal Nitrogen fertilization is resorted to, no benefit is derived from an application of pen manure. Organic matter, although essential to soil fertility, need not be applied to sugarcane soils. These soils are not only very rich in organic matter, but an application of 10 tons of pen manure, every rotation, is extremely low compared to the enormous amount of organic matter which is supplied yearly to the soil by a crop of sugarcane in the form of roots, trash and green leaves, even after allowing for the green leaves which is taken off the field as fodder.

Lime Trials

This series consisted originally of five trials located in the humid and superhumid zones of the island.

The layout adopted is a $3 \times 3 \times 3$ factorial design, with every combination of Lime, Potash and Magnesia, at three levels each. Of the 5 trials, one had to be abandoned, because a drain was made to pass on the site of the experiment.

The fertilizers applied to these trials are given below :—

	Kgs. per arpent		
	0	*1*	*2*
Muriate of Potash	nil	75	150
Sulphate of Magnesia	nil	25	50

No lime was applied to the first ratoons, so that it is the residual effect of the lime application at planting that is considered.

The trials were harvested in first ratoons, and the result are presented in Table III below :—

TABLE III

TABULATED RESULTS OF LIME TRIALS (1950)

Comparative Yield of Millable Cane

	Lime			*Potash*			*Magnesia*		
	0 Ca	*1 Ca*	*2 Ca*	*0K*	*1K*	*2K*	*0 Mg*	*1 Mg*	*2 Mg*
Riche Bois ...	100	99	97	100	106	107	100	97	95
Bénarès	100	107	108	100	105	101	100	93	97
Henrietta ...	100	108	108	100	99	102	100	107	107
Olivia	100	94	95	100	93	95	100	100	96
Gen. Average Tons / arp. ...	29·2	29·8	29·9	29·3	29·7	29·8	30·0	29·6	29·4
Comparative Yield	100	102	102	100	101	102	100	99	98

Results of Statistical Analysis of Lime Trials

Locality	*Linear Response*			
	Ca	*K*	*Mg*	*Sig. diff: (20:1)*
Riche Bois	−0·9	+2·5	−2·1	±3·4
Benares...	+2·7	+0·3	−0·9	±3·6
Henrietta	+2·0	+0·5	+1·6	±1·9
Olivia	−1·2	−1·3	−1·1	±2·8
Average ...	+0·7	+0·5	−0·6	

It is seen from the above table that the average response for the series to either Lime, Potash and Magnenia, is small and probably not signifiant ; but it will be noted that in one trial, their is a significant response to lime application.

Sugar analyses were made on composite samples of cane from these trials at harvest, with the following average results :—

	Lime			*Potash*			*Magnesia*		
	0	*1*	*2*	*0*	*1*	*2*	*0*	*1*	*2*
C.C.S per cent cane (1950) ...	14·2	14·0	14·3	14·6	14·0	14·7	14·5	14·2	14·4
Tons C.C.S. per arpent ...	4·15	4·17	4·28	4·28	4·16	4·38	4·35	4·20	4·23
C.C.S. Average for 2 crops ...	14·30	14·25	14·20	14·50	14·25	14·75	14·40	14·20	14·30

The main object of these lime experiments is to find out whether applications of lime or magnesia are justified in the humid and superhumid zones of the island. This object can be reached by laying down trials of a less complex nature than factorial experiments. Moreover, being given that Potash is already included in another series of trials, it was thought advisable to adopt a new layout on the Latin square basis with lime and magnesia at two levels each and combined. Two such trials have already been established and it is expected to extend the series this year.

Effect of differential fertilization on Sugar content of Sugarcane

Composite samples of M. 134/32 were taken, as usual, from the factorial experiments and analysed at the Experimental Cane Mill of the Station.

Ths summarized data for the series are given below :—

	Nitrogen			*Phosphoric Acid*			*Potash*		
	0	*1*	*2*	*0*	*1*	*2*	*0*	*1*	*2*
C.C.S. per cent cane (1950) ...	14·36	14·23	14·14	13·95	13·90	13·63	14·06	14·40	14·10
Tons sugar per arpent ...	2·73	3·71	4·07	3·40	3·42	3·40	3·39	3·51	3·60
Comparative Yield of sugar per arpent ...	100	136	149	100	101	100	100	104	106

The decrease in C.C.S. content due to the double dose of Nitrogen is here more than compensated by the increased yield of cane which was very high.

It is seen from ths above figures that the single and double doses of Nitrogen have produced increases in yield of sugar amounting to 36 per cent and 49 per cent respectively. The corresponding increases in yield of cane were 37 per cent and 52 per cent respectively.

The following figures are averages of about eighty experiments and show the gradual decrease in sugar content with increased Nitrogen application. No marked effect on sugar content is obtained following applications of either Phosphate or Potash.

COMMERCIAL CANE SUGAR PER CENT CANE

	Nitrogen	*Phosphoric Acid*	*Potash*
0 ...	12·96	12·65	12·60
1 ...	12·81	12·79	12·79
2 ...	12·60	12·73	12·65

Permanent Trials at C. E. S.

Bio 5. This trial has been carried out for almost 15 years, on the same layout, with the object of comparing the effect of a complete fertilization with that of withholding Phosphate and Potash.

The results of the 6th ratoon crop and those of the rotation are given below :—

	6th Ratoon Crop	*Average (7 crops)*	
	Tons Cane per arpent	*Tons cane per arpent*	*Comparative Yield*
Complete	28·4	31·2	100
Minus P	22·1	23·8	76
Minus K	13·3	20·4	65

Omission of Phosphate and Potash from the fertilizer mixture has resulted in an average reduction in yield of the order of 7·4 tons and 10·8 tons respectively.

The—K plots of the 6th ratoon crop yielded as low as 13·3 tons per arpent and typical Potassium deficency symptoms were found on canes grown in these plots. The trial has been uprooted and a fourth rotation started, on the same layout, with the variety M. 423/41.

Trial 69. The object of this trial is to compare two varieties, viz., M. 134/32 and M. 423/41, at two different levels of fertilization.

The high fertilization consists of 60 kilogrammes N, 75 kilogrammes P_2O_5 and 60 kilogrammes K_2O per arpent and is four times as much as the low fertilization.

The virgin crop was harvested at 20 months with the following results :—

TONS CANE PER ARPENT

	High Fertilization	*Low Fertilization*	*Response to Higher Level*	*Average*
M. 423/41	50·1	33·2	+16·9	41·7
M. 134/32	35·0	24·8	+10·2	29·9
Average	42·6	29·0	—	—
M. 423/41 compared to M. 134/32	+15·1	+ 8·4	—	+11·8

Reference to the above table shows a better response of M. 423/41 to high fertilization as compared to M. 134/32. This is interesting to note, as a very desirable character in a variety is its ability to respond to fertilizer applications.

Bio 6. This trial was undertaken, many years ago, in order to investigate whether the subsoil could be rendered productive, by proper treatment.

It consisted of 5 replications of a randomized block, in which soil, subsoil and a mixture of soil and subsoil were treated with phosphatic fertilizers and farmyard manure.

This trial, under M. 134/32, was harvested in 4th ratoons.

The difference in yield of cane between the soil and subsoil plots, which was very marked at the beginning of the rotation, has gradually disappeared and is not evident at all, in the fourth ratoon crop. This is probably due to the fact that the plots being so small, there has been a certain washing away of the top soil from one plot to another.

If the average figures for the complete rotation are considered, it appears that there is still a greater response to Phosphate in the subsoil plots than in the soil plots :—

	Tons cane/arpent		
	Phosphate	*No Phosphate*	*Response to Phosphate Application*
Soil	31·7	20·0	+ 11·7
Soil + subsoil ...	32.0	21·4	+ 10·6
Subsoil	32·2	18·7	+ 13·5

It can be concluded from the above figures that subsoil fertility may be improved by appropriate phosphate applications.

Fertilizing Value of Crushed Basalt

The investigations on the fertilizer value of crushed basalt have been continued along the lines laid down in previous years.

A. Field Experiments

1. *Belle Rive Latin Square.* It is unfortunate that this experiment which is the oldest in the basalt series and which has already yielded information of a most important nature on the value of basalt was harvested for the second time without the Station being informed.

2. *Hermitage Basalt Trial.* The $3 \times 2 \times 2$ factorial experiment at Hermitage was harvested this year in second ratoons and yielded the following average results :—

	Tons cane per arpent
OB—No Basalt	32·4
1B— 91 tons Basalt per arpent ...	34·2
2B—182 tons Basalt per arpent ...	37·2
Significant difference (20 : 1)	± 2·5

The above figures show, once more, that the double dose of basalt has caused a significant increase in yield over both the control and the single dose.

The following figures give the yield produced by the two varieties and by the two levels of fertilization :—

Variety	*Tons cane per arpent*	*Fertilization*	*Tons cane per arpent*
M. 134/32	33·5	Single fertilization	34·3
M. 63/39	35·7	Double fertilization	34·9
Significant difference (20 : 1) ...	± 2·1	Significant difference (20 : 1) ...	± 2·1

The double fertilization did not give significantly better yields than the single fertilization, which consisted of 30 kilograms N, 25 kilograms P_2O_5 and 25 kilograms K_2O per arpent.

M.63/39 once more outyieided M.134/32 by a significant margin

The average response to applications of basalt for the three crops is given below :—

	Tons cane per arpent		
	0B	*1B*	*2 B*
Virgin crop	31·9	33·6	36·3
1st ratoon crop	26·7	29·8	32·6
2nd ratoon crop	32·4	34·2	37·3
TOTAL for 3 crops ...	91·0	97·6	106·2

The above figures show a gain of 15·2 tons of cane for 3 crops or an average of 5 tons per crop, following a single application of basalt at planting. It will be interesting to see how long this cumulative effect of basalt will last and also how long it will take to repay the cost of application of the basalt.

Composite samples of cane, from the basalt experiment, were analysed for sugar with the following results :—

COMMERCIAL CANE SUGAR % CANE

	M. 134/32	*M. 63/39*	*Average 2nd ratoon*	*Average for 3 crops*
0B	12·25	11·50	11·90	11·18
1B	12·70	11·70	12·20	11·44
2B	12·00	12·20	12·10	11·30

The general average figures for the three crops suggest a slight gain in sugar content following basalt application.

B. POT EXPERIMENTS

A series of pot experiments was started a year ago in order to determine which of the constituents of basalt is responsible for the increase in yield resulting from an application of the crushed rock. Details of the experiment were given in last year's report.

Four crops of oats have been grown in these pots and the series is being continued. Only remarks of a general character will be made, at this stage, on these experiments :—

(*a*) The benificial effect of basalt is only evident on the more laterized soil type, i.e., the less fertile soils.

(*b*) Lime and potash show a benificial effect on the Mon Desert and Cascade type, but not on the Ebene type of soil.

(*c*) No beneficial effect was observed by the addition of Magnesia.

Foliar Diagnosis

As stated previously, a certain amount of analytical work was carried out. Leaf punches, collected for foliar diagnosis, from the factorial experiments since 1949, were analysed for N and P_2O_5.

It was unfortunately not possible to carry the K_2O determinations owing to shortage of staff and delay in delivery of equipment and reagents for rapid tests. It is expected, however, that these results will be available very shortly.

Phosphate. The following data are connected with one trial which showed a definite response to P_2O_5 :—

P_2O_5 applied in kgs. / arp.	*P_2O_5 % Dry matter of leaf punch*	*Tons cane per arpent*	*Comparative Yield of Millable Cane*
0	0·38	25·0	100
25	0·40	28·4	114
50	0·44	32·0	128

Four other trials showed a response to P_2O_5, which however failed to reach significance.

The following are the results obtained from these trials which show a slight response to P_2O_5 :—

P_2O_5 applied in kgs. / arp.	*P_2O_5 % Dry matter of leaf punch*	*Tons cane per arpent*	*Comparative Yield of Millable Cane*
0	0·41	26·1	100
25	0·52	27·0	103
50	0·53	28·8	110

Ten other trials showed no response to P_2O_5. The data in connection with these are :—

P_2O_5 applied in kgs. / arp.	*P_2O_5 % Dry matter of leaf punch*	*Tons cane per arpent*	*Comparative Yield of Millable Cane*
0	0·49	26·3	100
25	0·51	26·5	101
50	0·49	25·4	97

After consideration of the above figures, it is seen that a big response is obtained with an initial P_2O_5 figure of 0·38 per cent, a slight response when P_2O_5 is 0·41 per cent and no response at all at the 0·49 per cent level.

This in accordance with the optimum already adopted for P_2O_5 which is 0·45 per cent dry matter of the leaf punch.

Nitrogen. The following figures give the average Nitrogen content of all the fertilizer trials for the 4 ratoon crops.

It should be remembered that all these trials responded to Nitrogen fertilization :—

	N% dry matter leaf punch		
	0 N	*1 N*	*2 N*
1st ratoon 1947	1·45	1·70	1·87
2nd ratoon 1948	1·57	1·81	1·95
3rd ratoon 1949	1·13	1·34	1·53
4th ratoon 1950	1·20	1·37	1·51

Reference to the above table shows that low figures were obtained for the last two ratoons, as compared to the optimum previously adopted for N, namely 1·85 per cent.

These low figures, however, compare well with the average N content of leaf punches of estate fields under normal fertilization.

On the other hand, there is no indication of a lowering of N content in old ratoons ; past experience has tended to show that all ratoons are comparable in this respect.

Is this discrepancy due to variations in climatic conditions prevailing at time of sampling ?

Is N more susceptible to these variations than P_2O_5 and K_2O ?

One point, however, needs mentioning: whereas P_2O_5 and K_2O contents of leaves in one year are closely correlated to those of the previous year, no such correlation is obtained for Nitrogen.

For the time being, therefore, and until the above questions will have been answered, the optimum for Nitrogen will be revised, so as to take into consideration the low figures mentioned above, and the optimum suggested will be 1·65 per cent dry matter of leaf punch.

Varietal Difference

Leaf punches were also collected from variety trials conducted by the Cane Breeding Division in order to compare the foliar diagnosis of M. 423/41 and E. 1/37 to that of M. 134/32.

The average figures obtained are:—

Comparison between M. 423/41 and M. 134/32

	Average of 11 trials % dry matter leaf punch	
	N	P_2O_5
M. 423/41	1·26	0·52
M. 134/32	1·24	0·51

Comparison between E. 1/37 and M. 134/32

	Average of 5 trials % dry matter leaf punch	
	N	P_2O_5
E. 1/37	1·28	0·56
M. 134/32	1·30	0·53

There does not seem to be any marked difference between N, and P_2O_5 content of the three varieties, but more data are needed before any conclusion may be drawn respecting the difference between the foliar diagnosis of these varieties.

SYDNEY M. FEILLAFÉ,
Acting Chemist.

PART III—BOTANY DIVISION

The work of the Division was severely handicapped by lack of staff throughout the year under review, and had to be considerably curtailed when Mr. E. Rochecouste, Acting Botanist, left the Colony on study leave in July. No experimental work on chemical weed control was carried out, and the routine work of the Division was entrusted to Mr. B. Nundloll, Officer in Charge of Cultural Methods.

Pre-Treatment of Sugarcane Setts

Test of New Subtances. Of the three trials laid down in 1949 at Labourdonnais, Bénarès and Ferney Sugar Estates, to test the effects of pre-treating sugarcane setts on Pineapple disease incidence and yield of cane at harvest, only the one at Labourdonnais could be completely harvested. The trial at Bénarès and part of the one at Ferney were harvested by these estates through an oversight.

The number of cuttings infested with Pineapple disease in these experiments is as follows:—

Estate	*Labourdonnais*	*Benarès*	*Ferney*
Number of cuttings per plot	200	260	160
Treatments	*Average number of infested cuttings per plot*		
Control	1·25	13·00	11·8
Aretan 1%	1·50	2·25	1·2
Abavit S 1%	0·00	0·00	1·4
Agrosan GN 1%	0·25	1·75	0·8
Lime solution 10% ...	—	—	9·2
Significant difference ...	Not calculated	± 3·2	± 5·0

The results of these trials confirm, on the whole, previous findings that Aretan, Abavit S and Agrosan GN, are effective in controlling Pineapple disease. It is not possible to draw any conclusion regarding the yield results due to the fact that full data have only been obtained for one trial.

Investigations on yield Effects of Interplanting Foodcrops with Sugarcane

Of the four trials established in 1949, only three could be reaped in 1950. The trial at Bénarès was harvested by the estate itself without the plot yields being recorded.

Five new trials have been planted out in 1950 at Britannia, Grande Rosalie, Mon Désert–Mon Trésor and Solitude Sugar Estates and at the Hermitage Experimental Station, and will be cut in 1951.

All these experiments have been laid down on the Latin Square design as the previous ones.

The results of the experiments reaped in 1950 are given in the following tables :—

FERNEY S. E. (FIRST RATOON)

Date of harvesting (a) virgin canes : 8.12.49 ; (b) ratoon : Nov. 1950.

Sugarcane variety : M. 134/32.

Foodcrops interplanted : Maize and groundnuts.

Treatments	*Tons cane per arpent*	
	Virgins	*First Ratoon*
1. Sugarcane alone	32·5	37·4
2. Sugarcane with maize in alternate interline ...	31·6	31·2
3. Sugarcane with groundnuts in alternate interline...	30·5	33·9
Significant difference (20:1)	± 6·3	± 6·3

The results in plant cane are given for comparison purposes. Although the differences between treatments 1 and 2 and 3 are higher in first ratoon, they are again not significant.

The maize yields have been given in the 1949 Annual Report.

MON DESERT—MON TRESOR S.E.

Sugarcane Variety : M. 63/39

Time of planting sugarcane : beginning of June

Time of planting foodcrops : „ „

Foodcrop interplanted : maize

The maize plants made good growth despite the gravelly soil, and when the ears started maturing, they were bent down to prevent depredation by birds. The canes were harvested about fifteen months after planting, with the following results :—

Treatments	*Tons cane per arpent*
1. Sugarcane alone	54 9
2. Sugarcane with maize in alternate interline	47·1
3. Sugarcane with maize in every interline...	47·8
Significant difference	±20·6

The experimental error is much too high to allow of any conclusion being drawn regarding the yield of cane in the different treatments.

The maize gave the following yields per arpent :—

	Kgs.
In Treatment 2 ...	372
In Treatment 3 ...	815

PETITE ROSALIE

Date of planting sugarcane (Var : M. 134/32) : Mid-March

Date of planting foodcrops : Beginning of April

Foodcrops interplanted : maize and tomatoes.

Growth was excellent and stands were very regular, but the yields, produced by the foodcrops suffered considerable reduction due to the maize cobs being attacked by birds, and the tomato plants drying up after the first harvest as a result of unfavourable weather conditions :

The canes were cut when seventeen months old, with the following results :—

Treatments	*Tons cane per arpent*
1. Sugarcane alone	35·2
2. Sugarcane with maize in alternate interline	34·1
3. Sugarcane with tomatoes in alternate interline... ...	34·5
4. Sugarcane with maize in one interline and tomatoes in the other interline	39·3
Significant difference	± 4·4

Curiously enough, yield of cane has heen higher for treatment 4 than for treatments 2 and 3. The difference between treatments 1 and 4 is high but not significant.

The average yield of the foodcrops are as hereunder :—

	kgs. per arpent
Treatment 2—maize	355
Treatment 3—tomatoes	716
Treatment 4—maize	269
,, —tomatoes	643

ST. ANDRÉ S.E. *(Solitude)*

Time of planting sugarcane (Var : M. 134/32) : Mid–April

Time of planting foodcrops ... ... : Mid May

Foodcrops interplanted : Maize and Dholl Kessari

Growth of the maize seedlings was checked due to a slight attack by borers, but the plants subsequently recovered after a spell of rain. The young dholl Kessari seedlings were damaged by birds which uprooted them to eat the seeds soon after germination, and recruiting had to be resorted to in order to obtain regular stands. Some seeds were lost at harvest through bursting of the pods which had reached an advanced stage of maturity, but not in such a quantity as to affect the results of the experiment.

The trial was harvested at the beginning of September, that is, when the canes were about 17 months old, the results being as follows :—

Treatments	*Tons cane per arpent*
1. Sugarcane alone	23·8
2. Sugarcane with maize in alternate interline	23·0
3. Sugarcane with dholl Kessari in alternate interline ...	23·5
4. Sugarcane with maize in one interline and dholl Kessari in the other interline...	26·5
Significant difference	± 2·9

These results, although also apparently abnormal, are very similar to those obtained at Petite Rosalie, and will be discussed further.

The foodcrops gave the following yields :—

Treatments	*Yield in kgs. per arpent*
Treatment 2 —Maize	202
Treatment 3 —Dholl Kessari	77
Treatment 4 —Maize	217
Treatment 4 —Dholl Kessari	87

Conclusion. Summing up the results of the above trials, it may be inferred that :

(*a*) although there has been a reduction in yield of cane in two trials, due to the planting of foodcrops, the reduction is not statistically significant :

(*b*) in the other two trials, the plots containing sugarcane, maize and either tomatoes or dholl Kessari, have produce higher yields of cane than the control plots but the differences in yield are not significant. The results which appear abnormal *a priori*, are probably due to the fact that the cane may have benefitted from the total larger amount of artificials given to the foodcrops when these occur in every cane interline. This assumption appears to be borne out by the fact that cane yields have been significantly higher in plots with two foodcrops than in those with one foodcrop only. It must, however, be pointed out that these results contradict the 1949 results which appear more rational.

It is needless to emphasize that the results of many more experiments will probably be necessary before the effects of interplanting foodcrops with sugarcane can be objectively assessed. It must be borne in mind that such experiments are of a complex nature, due to the interplay of a considerable number of factors comprising, *inter alia*, the nature of the foodcrops grown and their frequency of occurrence in the cane interlines, the interval between the dates of planting the cane and foodcrops, the amounts of artificials applied to the cane and food crops, the differential effects of climate on the growth of the various crops under test, the localisation of the expriment, etc. The extent to which poaching takes place depends on the simultaneous effects of a number of these factors.

One of the difficulties inherent in the cane-foodcrops trials is the assessment of the adequate amounts of fertilizers to be applied to the foodcrops. It must be admitted that this is a difficult question, when it is remembered that the fertilization of sugarcane itself is not exactly known.

The planting of sugarcane and secondary crops in the same field is fundamentally an ecomic problem which resolves itself into determining whether the benefit derived from the cultivation of these crops is not offset by reduction in cane tonnages.

Field Trials on Secondary Crops

Linseed

The Division continued its work on linseed with a view to obtaining further data on the growth of that plant under varying environmental conditions in the island. In this connection, fertilizers, variety-and-time-of-planting, and spacing trials have been conducted at Reduit, Hermitage and Pamplemousses.

Fertilizer Trial. A factorial experiment was laid down at Reduit at the end of July with the varieties Rio and Punjab. The plant suffered from drought and had to be watered until seed setting began. Copious rains were received at the end of the season and started fresh regrowths and blossoms that rendered harvesting difficult.

The results of the trial are given below :—

Treatment	*Yield in kgs. per arpent*
O	219
N	222
P	214
K	188
NP	213
NK	332
PK	302
NPK	218
Significant difference	± 156

It may be inferred from the above figures that, although linseed has responded fairly well to the NK treatment, the response failed to reach significance at the 20 : 1 level.

The yields given by the two varieties are the following :—

Varieties	*Yield in kgs. per arpent*
Rio	291
Punjab	186
Significant difference	± 78

Rio was significantly superior to Punjab in this trial.

Spacing trial. A trial was laid down at Hermitage in Mid-July, and the seeds of the varieties Rio and Punjab planted in drills 6, 8 and 10 inches apart. The plants suffered from excessive rainfall after planting, and later from competition with weeds, and stands were gappy on the whole, despite continuous recruiting. The results obtained are the following :—

Spacing	*Yield in kgs. per arpent*
Drills 6" apart	191
Drills 8" apart	218
Drills 10" apart	154
Significant difference	± 96

There was thus no difference between any of the planting distances tested, and the performance of the two varieties under trial was as follows :—

Varieties	*Yield in kgs. per arpent*
Rio	128
Punjab	248
Significant difference	±115

The yields of these two varieties are somewhat different, but it must be remarked that the significant difference is very high.

Variety and Time of Planting Trial. Three trials were planted in three different localities, namely, Reduit, Hermitage and Pamplemousses to determine the best planting season for linseed.

Hermitage

Seeds were sown at monthly intervals as from the beginning of May. Adverse weather conditions affected seed germination and the subsequent growth of the seedlings. The plots had to be recruited several times, but with little success, so that not much significance can be attached to the results of this trial. The yield figures were the following—

Time of planting	*Yield in kgs. per arpent*
Beginning of May	279
Beginning of June	275
Beginning of July	310
Beginning of August	139

There was, in all probability, no difference in yield between the May, June and July plantings.

The variety Rio yielded 157 kgs. per arpent and Punjab 208 kgs. the difference between them being non-significant.

Pamplemousses

The experiment was started in mid-May, and the linseed varieties, Rio and Punjab were sown at monthly intervals in June, July and August. The May and June sowings gave rise to vigorous seedlings due to good rainfall, and stands were very regular; the plants were about 2½ ft. high when flowering commenced. Though germination was satisfactory in the plots planted in July and August, the seedlings suffered badly from drought; no irrigation water was available and the plants could not, therefore, be watered. The results of this trial are appended below :—

Time of Planting	*Yield in kgs. per arpent*
Mid May	288
Mid June	172
Mid July	5
Mid August	Nil
Significant difference	± 67

The May sowings were superior to the June sowings, and both were outstanding compared to the July sowings. No seeds at all could be collected from the plants derived from the August sowings as they dried up completely due to the water shortage.

The yields given by the two linseed varieties were the following :—

Varieties	*Kgs. per arpent*
Rio	157
Punjab	153
Significant difference	±155

Here again, there was no statistical difference between the yields of Rio and Punjab.

Reduit

Four varieties of linseed were sown at monthly intervals as from Mid May : Local, Royal, Punjab and Rio. Germination was satisfactory in all plots, but a certain amount of recruiting was necessary due to Damping-Off disease. As at Pamplemousses, the seedlings from the plots laid down in May and June made good growth and were tall at harvest. The plots planted in July and August were affected by the prevailing dry conditions and had to be watered occasionally.

The results are interesting and are as follows :—

Time of Planting	*Yield in kgs. per arpent*
Mid May	332
Mid June	225
Mid July	108
Mid August	66
Significant difference	± 61

As for the other trials, the May and June sowings have been superior to the July and August sowings.

The four varieties under trial gave the following yields :—

Varieties	*Yield in kgs. per arpent*
Local	153
Royal	180
Punjab	177
Rio	220
Significant difference	± 61

The only variety superior to the local variety was Rio.

Conclusions.—Summarizing the results of the variety-and-time-of-planting trials with linseed, it may be stated that : --

(i) the May and June plantings have, in general, been more successful than the July and August plantings. The good yield of linseed from the July sowings at Hermitage is, in all probability, due to the fact that the locality is cooler and wetter that either Reduit or Pamplemousses. In the light of the results obtained so far, trials to be conducted henceforth will comprise March and April sowings in addition to the May and June sowings.

(ii) there was, on the whole, as in 1949, no significant difference in yield capacity between the Rio and Punjab varieties. It should be borne in mind, however, that the oil content of these varieties is much lower than that of Royal.

Oats, Sweet Potato and Rice

Trials on these foodcrops have been conducted at Reduit and Hermitage, and their results are presented in the accompanying table.

The rice trial has completely failed due to a serious outbreak of leaf-spotting caused by the fungus *Helminthosporium*, and the disease known as "sterility in rice".

The following quantities of fertilizers have been applied in kilo per arpent : —

Foodcrops	*Sulphate of Ammonia*	*Guano Phosphate*	*Muriate of Potash*
Oats	Nil and 25	Nil and 100	Nil and 25
Sweet potato ...	Nil and 50	Nil and 250	Nil and 75

Oats. Two trials were planted at Reduit and Hermitage at the beginning of June. Growth was satisfactory throughout the growing period, but the plants had to be protected from birds at the seeding stage.

Sweet Potato. The experiment was laid down in mid-March, and the vines established themselves well.

The results of the fertilizer trial are as follows :—

Treatments	*Sweet Potato* (*Yield expressed as a percentage of the control*) *Hermitage*	*Oats* *Yield in kgs. per arbent* *Hermitage*	*Réduit*
O	100 (11·8 tons p.a.)	326	420
N	106	326	525
P	101	419	507
K	140	373	525
NP	117	326	507
NK	166	303	525
PK	123	373	577
NPK	140	443	525
Significance difference ...	± 38	± 70	±157

Sweet potato responded significantly to potash. Oats responded significantly to phosphate and to the complete fertilization at Hermitage, but to the PK treatment only at Reduit.

Groundnuts

A 3N × 3P × 3K experiment was laid down at Hermitage at the beginning of January, 1950 with the variety Vigan Lupog. The following fertilizers were applied :—

		kgs.	*kgs. per arpent*
Sulphate of Ammonia	Nil	100	200
Phosphatic guano	Nil	125	250
Muriate of Potash	Nil	75	100

Growth was excellent during the whole growing period. The linear response was as follows :—

	kgs. per arpent
Nitrogen	+512
Phosphate	+ 90
Potash	+ 6
Sig : diflerence	±232

There have therefore been a positive significant response to Nitrogen and positive but non-significant responses to Phosphate and Potash.

Potatoes

A variety-and-yield trial was laid down at Hermitage at the end of July with the varieties 134 and Up-to-date. Germination was badly affected by grub attacks and rainy weather. The plants recovered thereafter and grew well. Unfortunately a severe outbreak of Blight and Leaf Roll disease destroyed the haulms of the Up-to-date variety after the tubers had formed. The variety 134 was found to be rather resistant to these diseases and outyielded the Up-to-date variety, but the tubers were subject to rotting during storage.

The yield figures are appended below :—

Variety	*Kg. seed used per arpent*	*Yield in tons per arpent*
Up-to-date	600	2·6
134	600	4·9

134 proved therefore far superior to Up-to-date.

Sorghum

The propagation of several Sorghum varieties is still being pursued by the Division, and fairly good stocks have already been built up at the Central Experiment Station.

* * *

The writer is very thankful to Mr. B. Nundloll for having furnished all the data presented in this report, and to Mr. S. Feillafé for having checked the statistical analysis of the results of the trials on secondary crops. Mr. Nundloll also helped the Central Board and Sugar Technology Division of the Department of Agriculture to carry out the milling tests on M. 213/40 and E. 1/37.

A. de Sornay,
Plant Breeder.

Part IV—Extension Service Division

The work of the Extension Service during the first six months of the year was conducted by the Senior Field Demonstrator with the help of six Field Demonstrators. At the end of June, the Senior Field Demonstrator left the Colony on leave and was replaced by the writer.

Policy

It has been possible this year to extend the activities and services of the Division to a larger number of planters. Meetings were held and lectures delivered to the planters on the different aspects of agriculture, relating principally to sugarcane cultivation. The main subjects treated were as follows :—

1. The best time of planting, which varies according to different localities and climates.

2.—(*a*) Planting distances; (*b*) removal of stones from holes or furrows.

3. Contour planting to avoid erosion on slopes.

4. The selection of cuttings and their treatment with "Aretan."

5.—(*a*) The advantages of applying N, P, K fertilizers; (*b*) adequate fertilization in the different regions of the island and (*c*) the proper time of application of fertilizers.

6. The necessity of applying factory residues to compensate for the shortage of chemical fertilizers.

7. Procedure adopted in the allocation of fertilizers by the Controller of Supplies.

8. The necessity of frequent weedings specially during the dry season.

9. The economical use of weed killers as compared to hand weeding

10. The collection of leaf samples for foliar diagnosis,

11. The specified list of approved cane varieties, in conformity with Proclamations No. 10 of 1946 and No. 4 of 1947.

12. Drawing the attention of planters to the very poor quality of the guano phosphate being sold on the market by several unscrupulous small traders.

13. The advantage of obtaining their supply of phosphatic guano directly from importers, in order to avoid adulteration.

As a result of the experience gained on the big estates that mechanical cultivation is economical, numerous planters have contacted estate managers with the view to hiring tractors and bulldozers for use on their own lands.

A tribute must be paid to the Managers of Savannah—Savinia, Mon Désert—Mon Trésor, Rose Belle, Réunion, Britannia and Union—Flacq, who very willingly offered their machines.

The co-operation between these estates and planters is likely to benefit both parties as higher yields of cane are expected and therefore higher cane tonnages will be crushed by the millers.

Enquiries

Investigations were carried out in the case of 30 shopkeepers who applied to the Controller of Supplies for permits to sell fertilizers. The main object of delivering these permits is to allow the vegetable growers of different localities of the island to take delivery of the fertiltzers required by them in their village instead of at Port Louis. The permits are delivered under the following conditions :—

1. There should be a sufficient number of planters in the vicinity.

2. Priority is being given to a shopkeeper who is in possession of a General Retailer's licence.

3. The applicant should have a suitable store to stock his fertilizers.

4. He should be able to keep an account of his stock and send a monthly return to the Controller of Supplies.

Phosphatic Guano

As a result of the activities of the Division, sugarcane planters are now conscious of the beneficial effects of phosphatic guano. They have increased considerably their demand for this fertilizer, but, unfortunately on several occasions, they were unable to obtain their requirements, the importers having a limited stock which they reserved for their old customers : the estates and the big planters.

The attention of the Acting Chemist, Department of Agriculture and of the Advisory Board of the Controller of Supplies was therefore drawn to the fact and the importers of phosphatic guano were approached in view of increasing their stock next year.

Meetings

During the year, 85 meetings were held in co-operation with Co-operative Credit Societies. The Presidents and Secretaries of these Societies were asked a fortnight before to convene the maximum number of planters, whether belonging to the Co-operative Credit Societies or not. The chief subject dealt with at these meetings purports to the modern methods of sugarcane cultivation.

Apart from giving advices to cane growers. the Field Demonstrators had very often the opportunity of contacting vegetable growers and advising them whenever necessary.

Demonstration Plots

Nineteen manurial demonstration plots have been harvested and will be continued in ratoons during at least three years. Thirteen others have been laid down during the year.

The results obtained from the plots harvested have shewn an average increase in yield of 33 per cent, with a maximum of 100 per cent, in favour of plots having received the treatment recommended by the Sugarcane Research Station, as compared with the normal small planter's treatment. The maximum increases have been obtained in the higher rainfall regions, but increases of over 40 per cent have also been obtained in the lower parts of Grand Port and in Pamplemousses district, proving an evident phosphate deficiency in these soils.

It must be noted, however, that some erratic results have been recorded which can be accounted for by a bad and irregular germination of the cuttings and an extreme variability in the fertility of the plots.

Weed Killers

Thirty demonstrations of chemical weed control have been made on small planters' lands in presence of a large number of planters, most of whom take much interest in weed control problems.

The species of weeds controlled were the following :—

(1) Herbe "Solferino" *Ambrosia Artemisiifolia* ;

(2) "Bol" "Tam Tam" or "Oreille" *Hydrocotyle bonariensis.* These two weeds were easily controlled after one application of Fernoxone in 0.3 per cent aqueous solution.

(3) "Macaye" *Phalaris arundinacea* ;

(4) "Sapan „ *Accacia concinna* ;

and (5) "Chinois" *Artemisia vulgaris* were also eradicated after one application of Sodium chlorate in 10 per cent aqueous solution +.01 per cent Metoxone ;

(6) "Chiendent" *Cynodon dactylon* has, in addition, been treated on several occasions with 15 per cent Sodium chlorate solution +.01 per cent Metoxone, and the results were very encouraging although this weed was not completely killed after one application ; spot spraying was found to be necessary.

Distribution of a New Variety of Cane

This Division was responsible for the actual distribution of a total number of 185,415 canes of the variety M. 423/41 to planters all over the island. These canes were obtained from propagation plots and variety trials on different estates and at the experimental stations. The maximum number of canes was supplied from distribution centres such as Palmyre and Richelieu Experiment Station, where large areas were available.

Foliar Diagnosis

Small planters did not show much interest in foliar diagnosis this year, due to the fact that they had not been able, for various reasons, to take full advantage of the results obtained from samples taken in 1948 and 1949. In consequence, this year, leaf samples were taken only from fields showing marked mineral deficiencies or when requested by the planters themselves.

Soil Erosion in Flacq and Grand Port

In March 1950 severe erosion was noticed along the South East coast between Grand River South East and Ferney Sugar Estate. Following these observations, the Tea Officer was invited by the Director of Agriculture to visit the locality for a preliminary survey and submitted a short report on his findings. Later, a complete survey of the region was carried out by the Extension Service and a detailed report submitted to the Director of Agriculture. The extent of the erosion in the various areas, the types of crops grown and the names of the planters were indicated on a large scale map.

A short practical course on the lay out of drains was given by the Tea Officer to all officers of the Division with a view to help them in advising all small planters whose lands suffer from erosion.

Eupatorium Pallescens

At the request of the Entomological Division, propaganda for the plantation of *Eupatorium* was made among small planters, but with little success. Only a few big planters seem to have shown interest in the propagation of this plant and, when possible, officers of the Division have actually handed over seedlings to the planters themselves. It is suggested that, as a matter of experiment, plants be supplied free of charge to Co-operative Credit Societies planters, on condition that the planting be made under the control of the Field Demonstrators.

Other Activities

Demonstrations were carried out with different insecticides to combat the commoner insect pests of vegetables such as : Dacus flies, red spiders, thrips, caterpillars, red and white ants, etc. Explanations were given on the way of detecting certain forms of diseases occurring on vegetables and on the fungicides to be used in specific cases.

Conclusions

We are now in a position to say that there are noticeable improvements in the small planters' cultural methods, but nevertheless there still exist many problems towards which planters attention has already been drawn and which are still awaiting solution. It is a fact that the cost of production of sugarcane for small planters is still very high and must be lowered and the writer hopes that the following suggestions might be helpful :—

(*a*) Planters grouped in Co-operative Credit Societies or other associations could arrange to secure at least 2 sprayers for the control of noxious weeds. They could likewise arrange to keep in store, in their locality, stocks of Phosphatic Guano which could be sold in small quantities according to the needs of each planter.

(*b*) It would be a considerable help to small planters if they could obtain tractors and other machines for a preparation of their fields. Co-operative Credit Societies and Co-operative Credit Banks might prove useful in this respect.

JACQUES MAROT,
Acting Senior Field Demonstrator.

677/2/52—580